How this investigation fits within the “Concept and Lesson Map”:

**Overview for Unit 1**

“To learn about scale in space, students measure models of the sizes and distances of familiar sky objects, including objects within the Earth’s atmosphere and in space. They learn how apparent size relates to the distance of an object from the observer.” (GEMS, Space Science Sequence, Introduction, Science Background, Assessment Scoring Guides, page 8)

Overarching question(s) for this whole investigation:

* How do the sizes of the Sun, Earth, and Moon compare?
* How do the distances between the Sun, Earth and the Moon compare?
* How do scientists use models to understand these comparisons?

**Attending to “How People Learn”**

How People Learn Key Finding #1: Preconceptions

Eliciting Students Ideas:

Pre-Unit 1 Questionnaire, Session 1.1 Student Sheet: “The pre-unit questionnaires allow teachers to gather information about their students’ possible misconceptions and current understandings of the key concepts in the unit.” See Scoring Guide pages 68-70.

Common Student Preconceptions:

Guidebook for entire kit from GEMS Space Science Sequence, Background, page 25

How People Learn Key Finding #2: Facts/Concepts/Knowledge

WA State Content Standards “Science Domains” (EALR 4):

* K-1 ES1C The Moon can be seen sometimes during the day and sometimes during the night. The Moon appears to have different shapes on different days.
* 4-5 ES1D The Sun is a star. It is the central and largest body in our Solar System. The Sun appears much brighter and larger in the sky than other stars because it is many thousands of times closer to Earth.
* Solar System. The Sun appears much brighter and larger in the sky than other stars because it is many thousands of times closer to Earth.

WA State Content Standards “Science Domains” (EALRs 1-3):

* 4-5 INQF Models
* A scientific model is a simplified representation of an object, event, system, or process created to understand some aspect of the natural world. When learning from a model, it is important to realize that the model is not exactly the same as the thing being modeled.
* 4-5 INQG Explain
* Scientific explanations emphasize evidence, have logically consistent arguments, and use known scientific principles, models, and theories.

Key understandings for the teacher:

* + See The Key Concept Wall on page 223

How People Learn Key Finding #3: Metacognition

Metacognition: How did my thinking change? What caused the change? How did I come to believe this?

* The post-unit questionnaires allow teachers to gather information about how students’ ideas and understandings have changed during the unit and to measure progress in students learning. See Post-Unit Questionnaire, Session 1.9 Student Sheet, and Scoring Guide pages 71-73. See *Taking the Post-Unit Questionnaire,* pages 232-234.
* See Guidebook for entire kit from GEMS Space Science Sequence, meaning-making discussions, writing prompts and evidence circles, number 6 of page 3.
* Evidence of Student Understanding:
* Pre and Post Questionnaires, Session 1.1 Student Sheet and Session 1.9 Student Sheet, Scoring Guides pages 68-73.

**Additional Information**

* See Teacher Considerations sections (odd numbered pages throughout unit).
* Use [http://www.postimage.org/image.php?v=gx1G8GWS](http://www.google.com/url?q=http%3A%2F%2Fwww.postimage.org%2Fimage.php%3Fv%3Dgx1G8GWS&sa=D&sntz=1&usg=AFQjCNHY92h_ktGx-I7mAZx957IIvYiE6A) to emphasize the concept of relative size and the size comparisons of the Earth, the Sun, and the Moon.
* You may choose to download Stellarium ([http://www.stellarium.org/](http://www.google.com/url?q=http%3A%2F%2Fwww.stellarium.org%2F&sa=D&sntz=1&usg=AFQjCNExS40va8BnM8NHUiAkXOnqGo7roQ)) and Celestia ([http://www.shatters.net/celestia/](http://www.google.com/url?q=http%3A%2F%2Fwww.shatters.net%2Fcelestia%2F&sa=D&sntz=1&usg=AFQjCNGg3bpkT_9QEZySETzNO1tzQcqsZQ)) to emphasize the concept of relative size and the size comparisons of the Earth, the Sun, and the Moon. These are both free open source.

Materials and Student Management

See Teacher Considerations sections (odd numbered pages throughout unit).

Timing Considerations

See Teacher Considerations sections (odd numbered pages throughout unit).